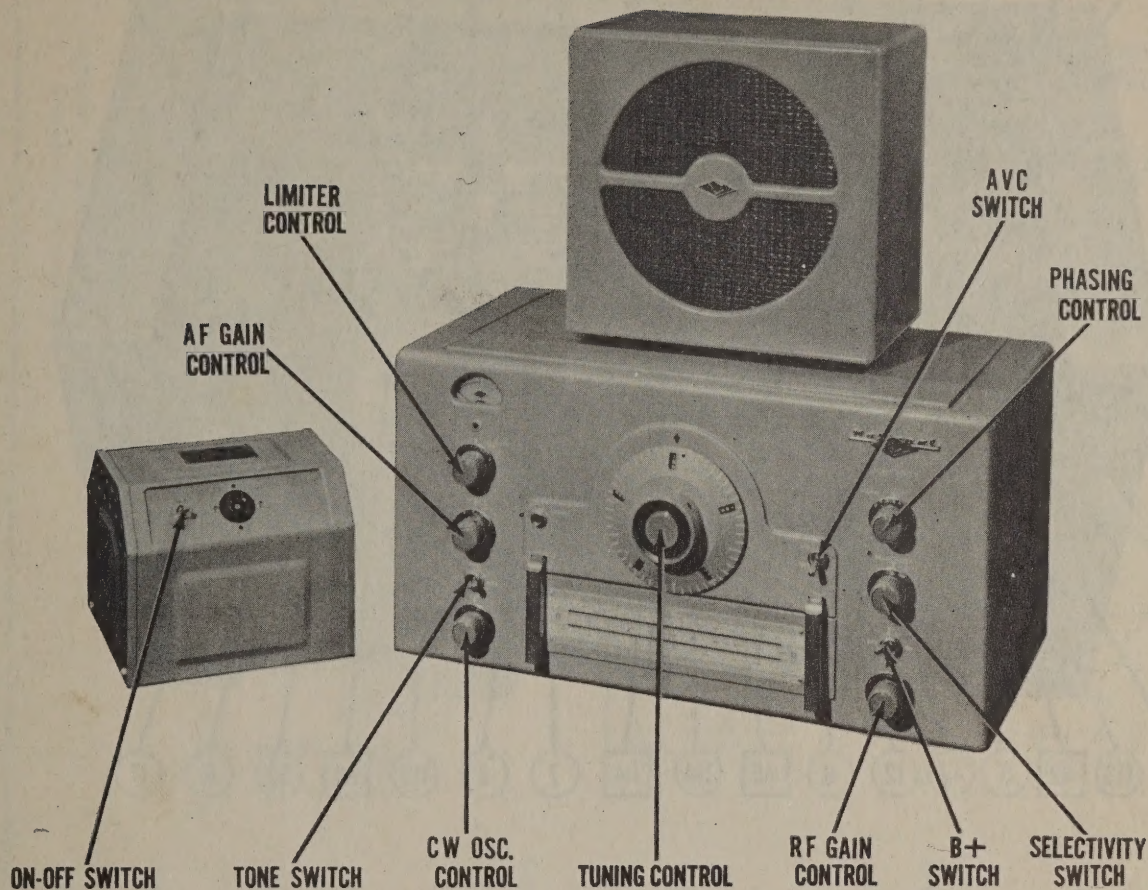


NATIONAL MODELS
HRO-7R, HRO-7T



NATIONAL MODELS
HRO-7R, HRO-7T

NATIONAL MODEL HRO-7T

TRADE NAME	National, Models HRO-7R, HRO-7T
MANUFACTURER	National Co., Inc., 61 Sherman St., Malden, Mass.
TYPE SET	AC or Battery Operated Commercial Type Multi-Band Superheterodyne Receiver
TUBES (THIRTEEN)	Types, 6K7 1st RF Amp., 6K7 2nd RF Amp., 6J7 Mixer, 6C4 Oscillator, 6J7 or 6K7 1st IF Amp., 6K7 2nd IF Amp., 6H6 Det.-AVC, 6J7 BFO, 6H6 Noise Limiter, 6SJ7 AF Amp., 6V6GT Power Output, OA2 Voltage Regulator, 5Y3GT Rectifier.
POWER SUPPLY	110-120 Volts AC, 220-240 Volts AC (697 Power Unit) or 6 Volt Storage Battery (686S Power Unit).
TUNING RANGE	- Band "A"-14.0-30.0MC, Band "B"-7.0-14.4MC, Band "C"-3.5-7.3MC, Band "D"-1.7-4.0MC (Following Bands available if desired) Band "E"-900-2050KC, Band "F"-480-960KC, Band "G"-180-430KC, Band "H"-100-200KC, Band "J"-50-100KC.

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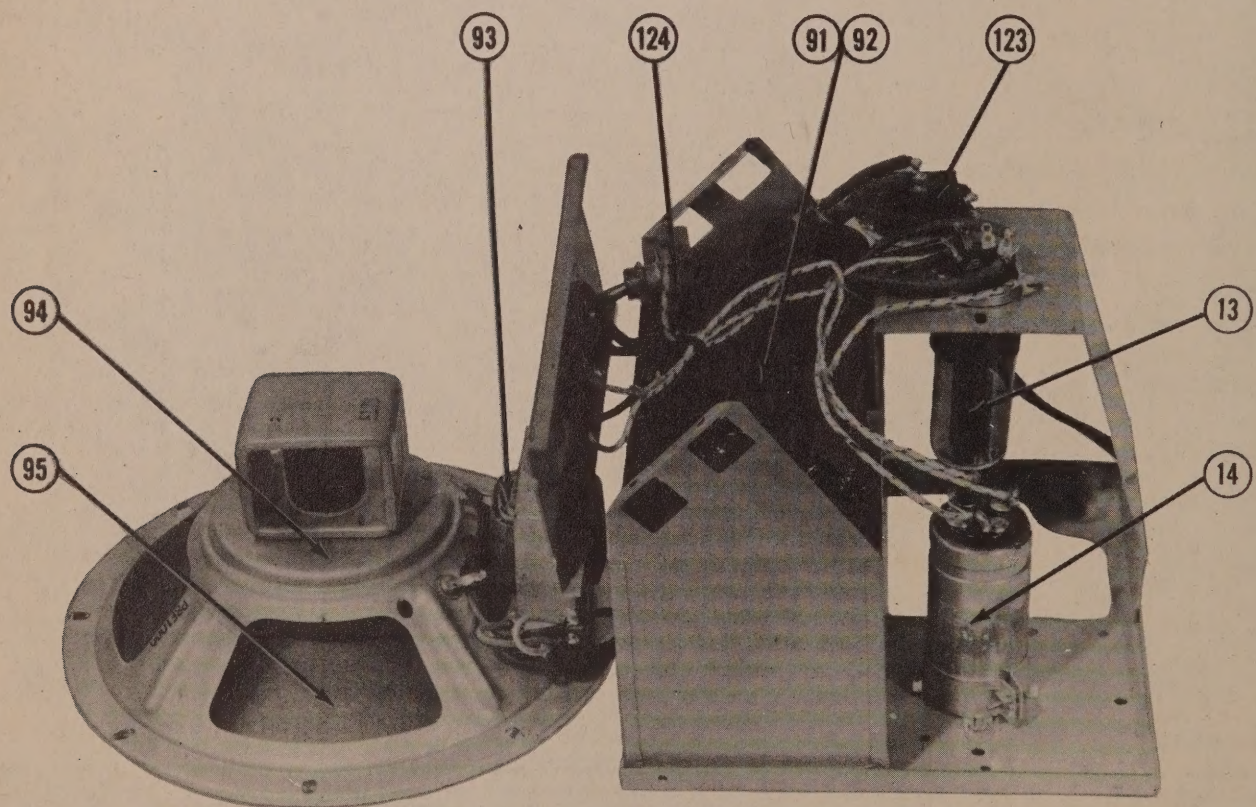
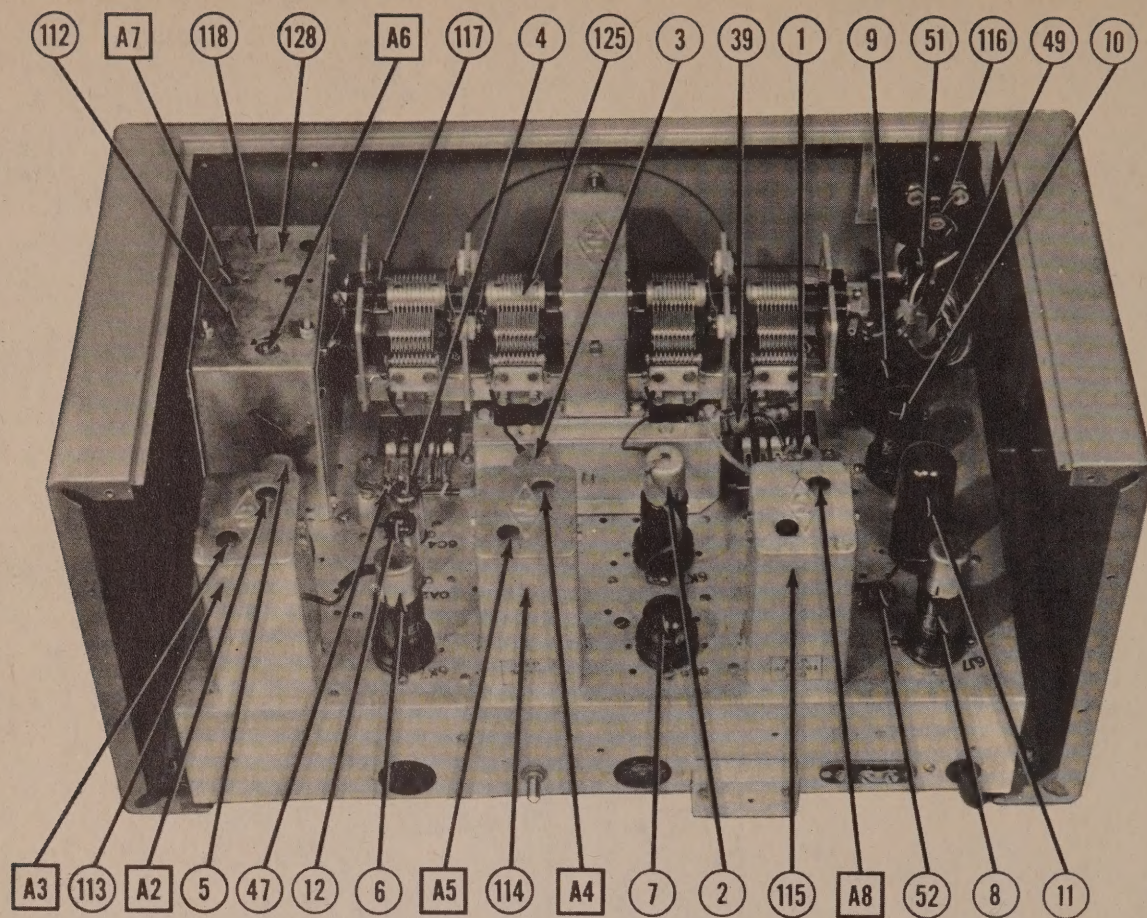
"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
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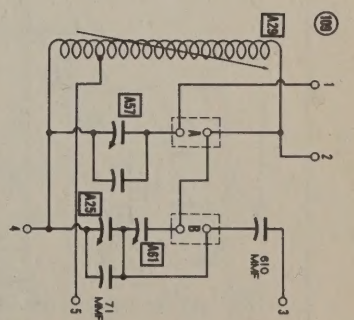
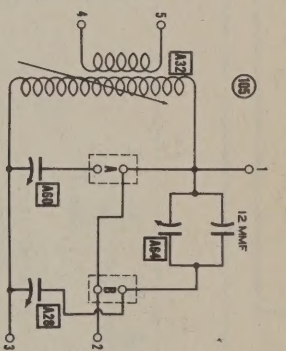
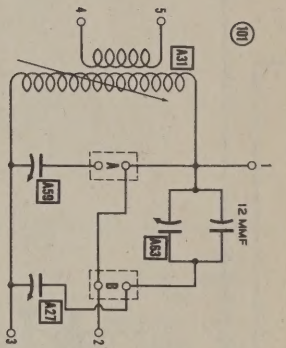
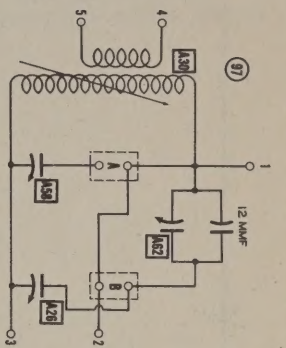
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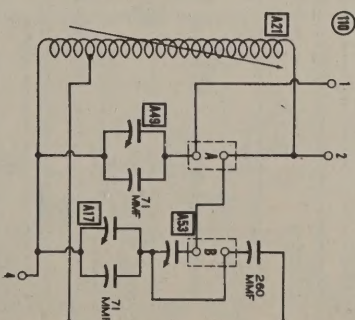
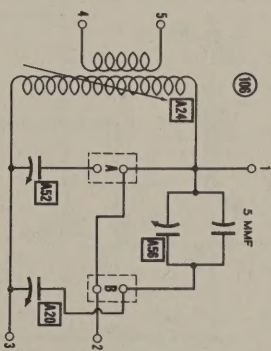
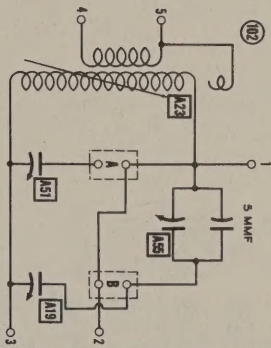
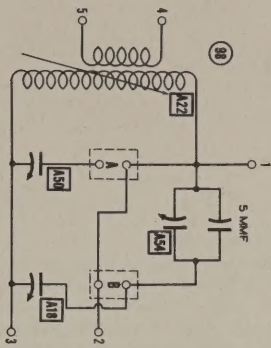
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SET #50-FOLDER #12

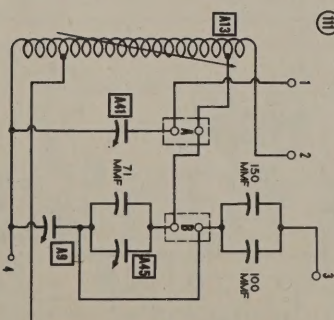
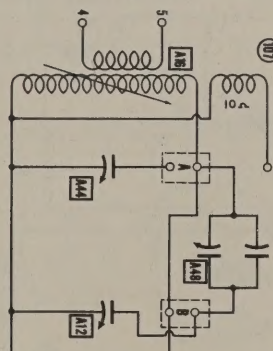
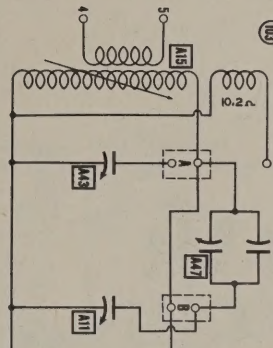
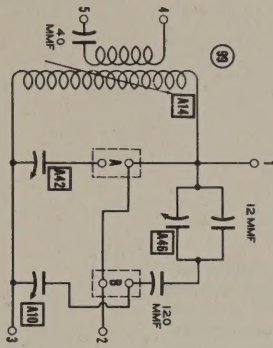




BAND C



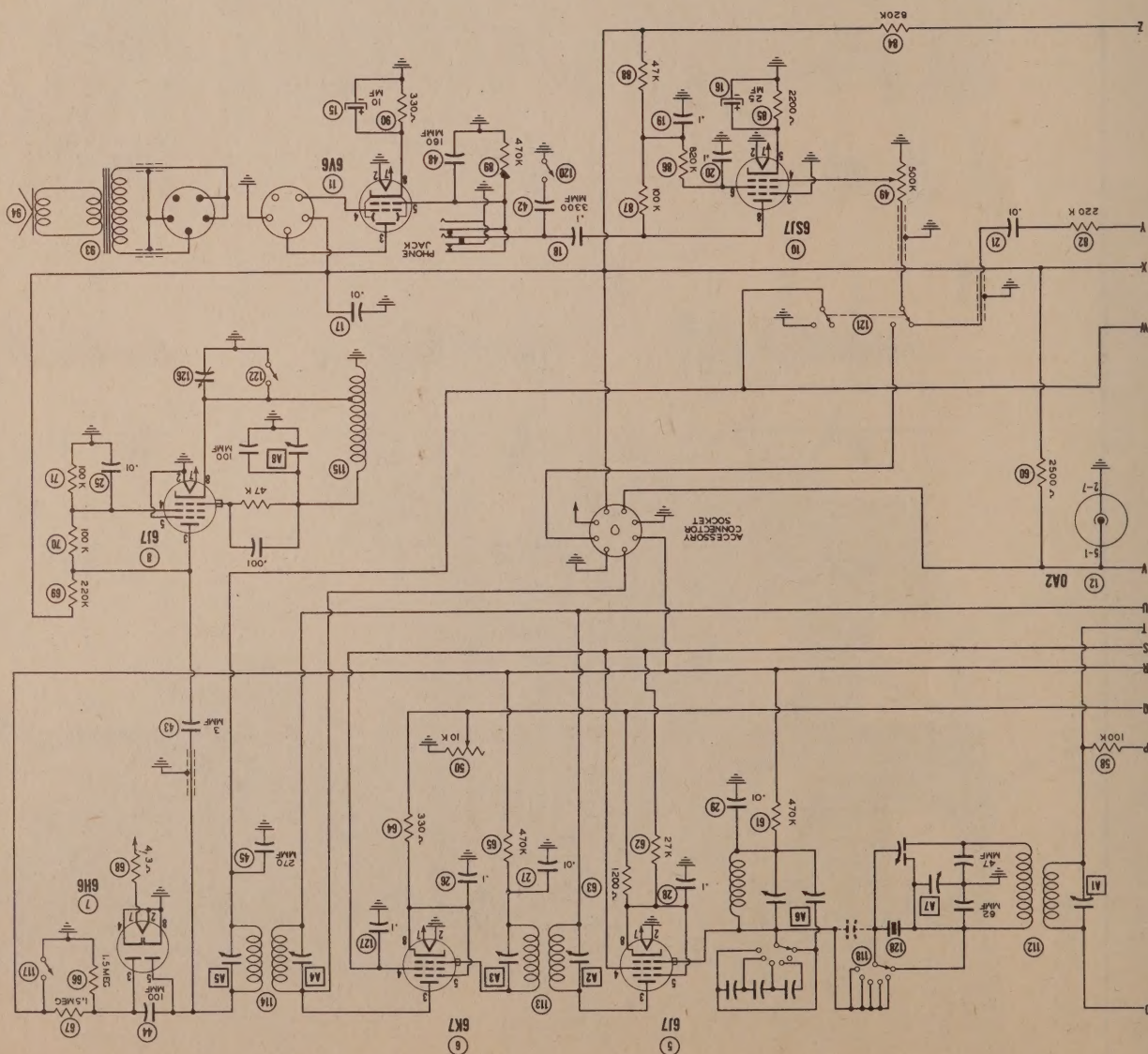
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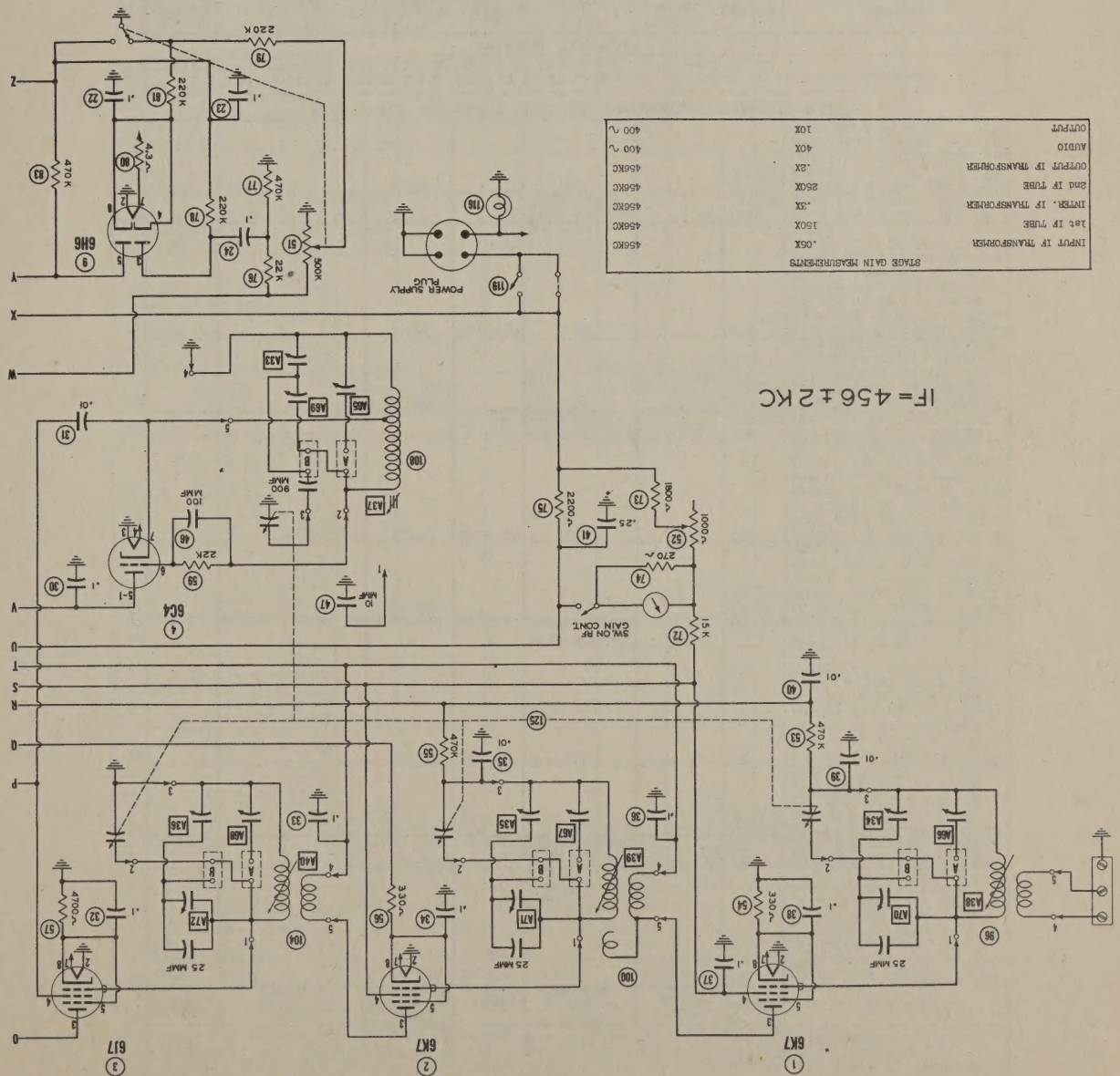
BAND A

4820-12

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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substituted for measurement.



BANDSPREAD ALIGNMENT						
Tracking of RF stages at low frequency end of each band may be checked as follows: After adjustments of padders is completed attempt to peak each stage with its associated high freq. trimmer. Any change in capacitance should cause a decrease in output if that stage is tracking correctly. This checking procedure will misalign the high frequency trimmers, therefore they should be repeaked at the high frequency end of the band per alignment instructions.						
DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	COIL SET	RADIO DIAL SETTING	OUTPUT METER	REMARKS
4008	High side to ant. terminal "A" Low res. side to center ant. terminal with link connected.	30.0MC	Band "A"	450	Across coil	Adjust for maximum output Tune sig. gen. to 30.9MC. If signal is not heard MC and open A41 to next peak. Adjust for maximum output and recheck for image.
17	"	"	"	"	"	Hook tuning cap. and ad- just for maximum output. A42, A43, A44 Repeat Steps 16, 17 & 18 until no further im- provement can be made. making Step 17 last step.
18	"	27.2MC	"	61	"	Adjust for maximum output. A45, A46 Repeat Steps 16, 17 & 18 until no further im- provement can be made. making Step 17 last step.
19	"	14.4MC	Band "B"	450	"	Adjust for maximum output. Tune sig. gen. to 15.3MC. If signal is not heard, MC and open A49 to next peak. Adjust for maximum output and recheck for image.
20	"	"	"	"	"	Hook tuning cap. and ad- just for maximum output. A50, A51, A52 Repeat Steps 19, 20 & 21 until no further im- provement can be made, making Step 20 last step.
21	"	14.0MC	"	50	"	Adjust for maximum output. A53, A54 Repeat Steps 19, 20 & 21 until no further im- provement can be made, making Step 20 last step.
22	"	7.3MC	Band "C"	450	"	Adjust for maximum output. Tune sig. gen. to 8.2MC. If signal is not heard, MC and open A57 to next peak. Adjust for maximum output and recheck for image.
23	"	"	"	"	"	Hook tuning cap. and ad- just for maximum output. A58, A59 Repeat Steps 22, 23 and adjust for maximum output. A63, A64
24	"	7.0MC	"	50	"	Adjust for maximum output. A61, A62 Repeat Steps 22, 23 and adjust for maximum output. A63, A64
25	"	4.0MC	Band "D"	450	"	Adjust for maximum output. Tune sig. gen. to 4.9MC. If signal is not heard, MC and open A65 to next peak. Adjust for maximum output and recheck for image.
26	"	"	"	"	"	Hook tuning cap. and ad- just for maximum output. A66, A67 Repeat Steps 25, 26 & 27 until no further im- provement can be made, making Step 26 last step.
27	"	3.5MC	"	50	"	Adjust for maximum output. A69, A70 Repeat Steps 25, 26 & 27 until no further im- provement can be made, making Step 26 last step.
1 ST RF STAGE ALIGNMENT WITH LOW IMPEDANCE TRANSMISSION LINE.						
If a low impedance transmission line is to be used with the receiver it may be necessary to realign the first RF amplifier at the high frequency end of each band.						
GENERAL COVERAGE						
DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	COIL SET	RADIO DIAL SETTING	OUTPUT METER	REMARKS
28	Antenna feeders must be connected. (Use radiated signal from sig. gen. with no direct connection)	30.0MC	Band "A"	Tune for max- imum output.	Across voice coil	Adjust for maximum output.
29	"	14.4MC	Band "B"	"	"	"
30	"	7.3MC	Band "C"	"	"	"
31	"	4.0MC	Band "D"	"	"	"
BANDSPREAD ALIGNMENT						
DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	COIL SET	RADIO DIAL SETTING	OUTPUT METER	REMARKS
32	Antenna feeders must be connected. (Use radiated signal from sig. gen. with no direct connection)	30.0MC	Band "A"	Tune for max- imum output.	Across voice coil	Adjust for maximum output.
33	"	14.4MC	Band "B"	"	"	"
34	"	7.3MC	Band "C"	"	"	"
35	"	4.0MC	Band "D"	"	"	"

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Controls should be set as follows except where noted otherwise: limiter control to "Off", AF gain at "10", tone switch at "High", CWO control at "Off", RF gain control at "9", B+ switch at "On", selectivity switch at "Off", Phasing control at "Zero" and AVC switch at "Off".

Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment tool for all adjustments.

IF ALIGNMENT CHECK TO BE MADE PRIOR TO ALIGNMENT.

- Set selectivity switch to 5, AVC to "Off", RF gain at "9", Phasing control at zero and CWO control to "On". Vary CWO control to point of lowest background noise and note setting, which should occur near 9.
- Set selectivity switch to "Off" and vary CWO control to point of lowest background noise and note setting which should occur near 9.
- If alignment is correct the two settings from (a) to (b) should coincide and steps 1, 2 and 3 may be omitted.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	COIL SET	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1 Direct	High side to chassis. Mixer tube (2). Low side to 456KC (unmodulated).	Approx. 456KC	Band 5	Tuning cap. fully open.	Across voice coil	A1,A2, A3,A4, A5	Set selectivity switch at "5". Turn CWO "On". Adjust sig. gen. frequency for maximum output. Adjust A1 thru A5 to give approximately 400 V note. Adjust A1 thru A5 for maximum output. Set selectivity switch to "Off".
2 Direct	"	"	"	"	"	A6	Set selectivity switch to 4KC to either side of tuned frequency. Return selectivity switch to "Off".
3 Direct	"	"	"	"	"	A7,A8	Adjust A7 for maximum output. Check CWO tuning per part (b) of IF Alignment check in preliminary instructions. If setting of CWO control does not occur near "9" set CWO control at "9" and adjust A8 for lowest background noise. If setting is at or near "9" then A8 is adjusted correctly.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	COIL SET	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
4 4000 carbon terminal "A". Low side to center ant. terminal with link connected.	High side to ant.	30.0MC	Band "A"	485	Across voice coil	A9	Adjust for maximum output. Tune sig. gen. to 30.9MC. If signal is not heard, return sig. gen. to 30.0 MC and open A9 to next peak. Adjust for maximum output and recheck for image.
5 "	"	"	"	"	"	A10, A11,A12	Rock tuning cap. and adjust for maximum output. Tune sig. gen. to 15.8MC. If signal is not heard, return sig. gen. to 14.4 MC and open A17 to next peak. Adjust for maximum output and recheck for image.
6 "	"	14.4MC	"	"	"	A13,A14	Repeat Steps 4, 5 & 6 until no further improvement can be made, making Step 5 last step.
7 "	"	"	Band "B"	485	"	A17	Adjust for maximum output. Tune sig. gen. to 15.8MC. If signal is not heard, return sig. gen. to 14.4 MC and open A17 to next peak. Adjust for maximum output and recheck for image.
8 "	"	"	"	"	"	A18, A19,A20	Rock tuning cap. and adjust for maximum output. Tune sig. gen. to 7.8 & 9 until no further improvement can be made, making Step 8 last step.
9 "	"	7.0MC	"	"	"	A21,A22	Repeat Steps 7, 8 & 9 until no further improvement can be made, making Step 8 last step.
10 "	"	7.3MC	Band "C"	490	"	A25	Adjust for maximum output. Tune sig. gen. to 8.2MC. If signal is not heard, return sig. gen. to 7.3 MC and open A25 to next peak. Adjust for maximum output and recheck for image.
11 "	"	"	"	"	"	A26,A27	Rock tuning cap. and adjust for maximum output. Tune sig. gen. to 4.9MC. If signal is not heard, return sig. gen. to 4.0MC and open A33 to next peak. Adjust for maximum output and recheck for image.
12 "	"	3.5MC	"	"	"	A29,A30	Repeat Steps 10, 11 & 12 until no further improvement can be made, making Step 11 last step.
13 "	"	4.0MC	Band "D"	490	"	A33	Adjust for maximum output. Tune sig. gen. to 4.9MC. If signal is not heard, return sig. gen. to 4.0MC and open A33 to next peak. Adjust for maximum output and recheck for image.
14 "	"	"	"	"	"	A34, A35,A36	Rock tuning cap. and adjust for maximum output. Tune sig. gen. to 1.8MC. If signal is not heard, return sig. gen. to 1.0MC and open A33 to next peak. Adjust for maximum output and recheck for image.
15 "	"	1.8MC	"	"	"	A37,A38	Repeat Steps 13, 14 & 15 until no further improvement can be made, making Step 14 last step.

PARTS LIST AND DESCRIPTIONS (Continued) CONTROLS

ITEM No.	RATING		REPLACEMENT DATA		INSTALLATION NOTES
	RESISTANCE	WATTS	NATIONAL PART No.	IRC PART No.	
49A	500K Ω	$\frac{1}{2}$		D13-133	AF Gain Control
B	500K Ω	$\frac{1}{2}$		A	Attach to 49A per instructions
50	10K Ω	1.5		4-10K*	RF Gain Control & SW.
51	500K Ω	$\frac{1}{2}$		4-10K*	Limiter Control & SW.
52	100K Ω	$\frac{1}{2}$		4-10K*	5" Meter Control

*Use center & right hand terminals only.

RESISTORS

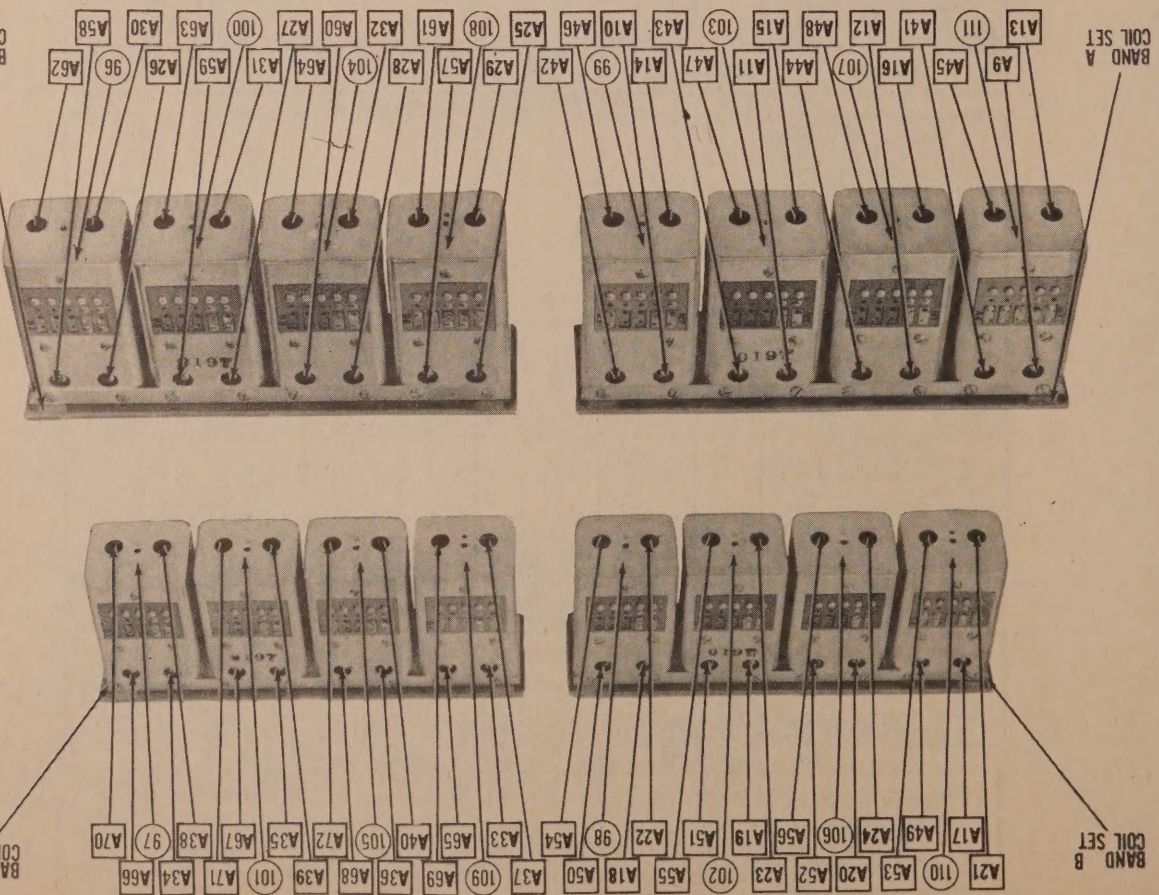
ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	NATIONAL PART No.	IRC PART No.	
53	470K Ω	$\frac{1}{2}$		BTS-470K	Y1.-Y1.-Y1. AVC Network
54	330K Ω	$\frac{1}{2}$		BTS-470K	Or.-Or.-Br. 1st RF Cathode
55	470K Ω	$\frac{1}{2}$		BTS-470K	Y1.-Y1.-Y1. AVC Network
56	330K Ω	$\frac{1}{2}$		BTS-470K	Or.-Or.-Br. 2nd RF Cathode
57	470K Ω	$\frac{1}{2}$		BTS-470K	Y1.-Y1.-Red Mixer Cathode
58	100K Ω	$\frac{1}{2}$		BTS-100K	Br.-Blk.-Y1. Mixer Screen
59	22K Ω	$\frac{1}{2}$		BTS-22K	Red-Red-Or. Osc. Grid
60	2500 Ω	$\frac{1}{2}$		AB-2500	Y1.-Y1.-Y1. AVC Network
61	470K Ω	$\frac{1}{2}$		BTS-470K	Red-V1.-Or. Screen Bleeder
62	1200 Ω	$\frac{1}{2}$		BTS-1200	Br.-Red-Red 1st IF Cathode
63	1200 Ω	$\frac{1}{2}$		BM-4-330	Or.-Or.-Br. 2nd IF Cathode
64	330K Ω	$\frac{1}{2}$		BTS-470K	Y1.-Y1.-Y1. AVC Network
65	470K Ω	$\frac{1}{2}$		BTS-1.5 Meg.	Br.-Grn.-Grn. " "
66	1.5 Meg.	$\frac{1}{2}$		BTS-1.5 Meg.	Y1.-Or.-Gold Fil. Dropping
67	1.5 Meg.	$\frac{1}{2}$		BM-1-4.3	Red-Red-Y1. BFO Voltage Dropping
68	220K Ω	$\frac{1}{2}$		BTS-220K	Br.-Blk.-Y1. BFO Screen Dropping
69	100K Ω	$\frac{1}{2}$		BTS-100K	Br.-Blk.-Y1. BFO Voltage Bleeder
70	100K Ω	$\frac{1}{2}$		BTS-100K	Br.-Grn.-Or. Screen Dropping
71	100K Ω	$\frac{1}{2}$		BT-2-15K	Br.-Gray-Red "8" Meter Network
72	15K Ω	$\frac{1}{2}$		BTS-1800	Red-V1.-Br. "8" Meter Shunt
73	1800 Ω	$\frac{1}{2}$		BM-4-270	Red-Red-Red 2nd IF Plate Decoupling
74	270 Ω	$\frac{1}{2}$		BTS-2200	Red-Red-Or. Diode Load
75	2200 Ω	$\frac{1}{2}$		BTS-22K	Y1.-Y1.-Y1. Limiter Plate
76	22K Ω	$\frac{1}{2}$		BTS-470K	Red-Red-Y1. Limiter Threshold Filter
77	470K Ω	$\frac{1}{2}$		BTS-220K	Y1.-Or.-Gold Limiter Cathode
78	220K Ω	$\frac{1}{2}$		SM-1-4.3	Red-Red-Y1. Lim. Plate Load
79	220K Ω	$\frac{1}{2}$		BTS-220K	Y1.-Y1.-Y1. Lim. Plate Cathode
80	4.3K Ω	$\frac{1}{2}$		BTS-220K	Gray-Red-Y1. Lim. Plate Decoupling
81	220K Ω	$\frac{1}{2}$		BTS-220K	Red-Red-Red AF Cathode
82	220K Ω	$\frac{1}{2}$		BTS-220K	Gray-Red-Y1. AF Screen
83	470K Ω	$\frac{1}{2}$		BTS-8200	Br.-Blk.-Y1. AF Plate Load
84	820K Ω	$\frac{1}{2}$		BTS-8200	Y1.-Y1.-Y1. AF Plate Load
85	2200 Ω	$\frac{1}{2}$		BTS-47K	Y1.-Y1.-Y1. Output Grid
86	820K Ω	$\frac{1}{2}$		BTS-47K	Or.-Or.-Br. Output Cathode
87	100K Ω	$\frac{1}{2}$		BTS-470K	
88	47K Ω	$\frac{1}{2}$		BM-2-330	
89	470K Ω	$\frac{1}{2}$			
90	330K Ω	$\frac{1}{2}$			

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA		
	PR.	SEC. 1	SEC. 2	NATIONAL PART No.	STANCOR PART No.	MERIT PART No.
91	250V AC tapped @ 117V	580V CT @ 2.0A	5.1V AC 6.2V AC @ 3.3A			
	AC @ 65A					

FILTER CHOKE

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	TOTAL DC CURRENT	D. C. RESISTANCE	INDUCTANCE (10 CURRENT 1000A)	NATIONAL PART No.	STANCOR PART No.	
92	.085A.	250 Ω	17 Henries			



PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		NATIONAL PART No.	STANDARD REPLACEMENT		
1	1st RF Amp.	6K7	6K7	7R	6K7 Alternate
2	2nd RF Amp.	6K7	6K7	7R	
3	Mixer	6J7	6J7	7R	
4	Oscillator	6C4	6C4	6B6	
5	1st IF Amp.	6J7	6J7	7R	
6	2nd IF Amp.	6K7	6K7	7R	
7	Det. AVC	6H6	6H6	7C	
8	Beat Freq. Osc.	6H6	6H6	7R	
9	AF Amp	68J7	68J7	7C	
10	AF Amp Output	68J7	68J7	7C	
11	Power Reg.	6V6GT	6V6GT	7AC	5B0
12	Voltage Reg.	0A2	5Y3GT	5B0	
13	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	NATIONAL PART No.	REPLACEMENT DATA		SOLAR PART No.	SPRAGUE PART No.	IDENTIFICATION AND INSTALLATION NOTES
			AEROVOX PART No.	CORNEIL DUHNER PART No.			
14A	8	475	E450-8-16	DP11145T	DL-3X8-450F	D8058	Filter
15	8	475					
16	10	50	PR850/10	BR105	M-10-50	TA-510	Output Cathode Bypass
17	10	50	TR850/25	BR255	M-25-50	TA-525	AF Cathode Bypass
18	0.1	500	684-01	DT681	ST-6-01	TC-11	RF Bypass Pwr. Supply
19	0.1	400	484-01	DT481	ST-4-1	TC-1	Audio Coupling
20	0.1	400	484-01	DT481	ST-4-1	TC-1	AF Plate Decoupling
21	0.1	400	684-01	DT681	ST-6-01	TC-11	AF Screen Bypass
22	0.1	400	484-01	DT481	ST-4-1	TC-1	Audio Coupling
23	0.1	400	484-01	DT481	ST-4-1	TC-1	Limiting Filter
24	0.1	400	684-01	DT681	ST-6-01	TC-11	Audio Coupling
25	0.1	400	484-01	DT481	ST-4-1	TC-1	1st IF Cathode Bypass
26	0.1	400	684-01	DT681	ST-6-01	TC-11	AVC Filter
27	0.1	400	484-01	DT481	ST-4-1	TC-1	1st IF Cathode Bypass
28	0.1	400	684-01	DT681	ST-6-01	TC-11	AVC Filter
29	0.1	400	484-01	DT481	ST-4-1	TC-1	Osc. Plate Bypass
30	0.1	400	684-01	DT681	ST-6-01	TC-11	Mixer Cathode Bypass
31	0.1	400	484-01	DT481	ST-4-1	TC-1	RF Byp. Pwr. Supply
32	0.1	400	684-01	DT681	ST-6-01	TC-11	AVC Filter
33	0.1	400	484-01	DT481	ST-4-1	TC-1	RF Byp. Pwr. Supply
34	0.1	400	684-01	DT681	ST-6-01	TC-11	Screen Bypass
35	0.1	400	484-01	DT481	ST-4-1	TC-1	1st RF Cath. Byp.
36	0.1	400	684-01	DT681	ST-6-01	TC-11	AVC Filter
37	0.1	400	484-01	DT481	ST-4-1	TC-1	IF Plate Decoupling
38	0.1	400	684-01	DT681	ST-6-01	TC-11	Tone Compensation
39	0.1	400	484-01	DT481	ST-4-1	TC-1	IF Coupling-Cer.
40	0.1	400	684-01	DT681	ST-6-01	TC-11	Diode Filter-Cer.
41	0.1	400	484-01	DT481	ST-4-1	TC-1	Osc. Grid Cap.-Cer.
42	0.1	400	684-01	DT681	ST-6-01	TC-11	Osc. Comp.-Cer.-Note 1
43	0.1	400	484-01	DT481	ST-4-1	TC-1	Output Grid Byp.-Cer.
44	0.1	400	684-01	DT681	ST-6-01	TC-11	Screen Bypass-Note 2
45	0.1	400	484-01	DT481	ST-4-1	TC-1	
46	0.1	400	684-01	DT681	ST-6-01	TC-11	
47	0.1	400	484-01	DT481	ST-4-1	TC-1	
48	0.1	400	684-01	DT681	ST-6-01	TC-11	
49	0.1	400	484-01	DT481	ST-4-1	TC-1	
50	0.1	400	684-01	DT681	ST-6-01	TC-11	
51	0.1	400	484-01	DT481	ST-4-1	TC-1	
52	0.1	400	684-01	DT681	ST-6-01	TC-11	
53	0.1	400	484-01	DT481	ST-4-1	TC-1	
54	0.1	400	684-01	DT681	ST-6-01	TC-11	
55	0.1	400	484-01	DT481	ST-4-1	TC-1	
56	0.1	400	684-01	DT681	ST-6-01	TC-11	
57	0.1	400	484-01	DT481	ST-4-1	TC-1	
58	0.1	400	684-01	DT681	ST-6-01	TC-11	
59	0.1	400	484-01	DT481	ST-4-1	TC-1	
60	0.1	400	684-01	DT681	ST-6-01	TC-11	
61	0.1	400	484-01	DT481	ST-4-1	TC-1	
62	0.1	400	684-01	DT681	ST-6-01	TC-11	
63	0.1	400	484-01	DT481	ST-4-1	TC-1	
64	0.1	400	684-01	DT681	ST-6-01	TC-11	
65	0.1	400	484-01	DT481	ST-4-1	TC-1	
66	0.1	400	684-01	DT681	ST-6-01	TC-11	
67	0.1	400	484-01	DT481	ST-4-1	TC-1	
68	0.1	400	684-01	DT681	ST-6-01	TC-11	
69	0.1	400	484-01	DT481	ST-4-1	TC-1	
70	0.1	400	684-01	DT681	ST-6-01	TC-11	
71	0.1	400	484-01	DT481	ST-4-1	TC-1	
72	0.1	400	684-01	DT681	ST-6-01	TC-11	
73	0.1	400	484-01	DT481	ST-4-1	TC-1	
74	0.1	400	684-01	DT681	ST-6-01	TC-11	
75	0.1	400	484-01	DT481	ST-4-1	TC-1	
76	0.1	400	684-01	DT681	ST-6-01	TC-11	
77	0.1	400	484-01	DT481	ST-4-1	TC-1	
78	0.1	400	684-01	DT681	ST-6-01	TC-11	
79	0.1	400	484-01	DT481	ST-4-1	TC-1	
80	0.1	400	684-01	DT681	ST-6-01	TC-11	
81	0.1	400	484-01	DT481	ST-4-1	TC-1	
82	0.1	400	684-01	DT681	ST-6-01	TC-11	
83	0.1	400	484-01	DT481	ST-4-1	TC-1	
84	0.1	400	684-01	DT681	ST-6-01	TC-11	
85	0.1	400	484-01	DT481	ST-4-1	TC-1	
86	0.1	400	684-01	DT681	ST-6-01	TC-11	
87	0.1	400	484-01	DT481	ST-4-1	TC-1	
88	0.1	400	684-01	DT681	ST-6-01	TC-11	
89	0.1	400	484-01	DT481	ST-4-1	TC-1	
90	0.1	400	684-01	DT681	ST-6-01	TC-11	
91	0.1	400	484-01	DT481	ST-4-1	TC-1	
92	0.1	400	684-01	DT681	ST-6-01	TC-11	
93	0.1	400	484-01	DT481	ST-4-1	TC-1	
94	0.1	400	684-01	DT681	ST-6-01	TC-11	
95	0.1	400	484-01	DT481	ST-4-1	TC-1	
96	0.1	400	684-01	DT681	ST-6-01	TC-11	
97	0.1	400	484-01	DT481	ST-4-1	TC-1	
98	0.1	400	684-01	DT681	ST-6-01	TC-11	
99	0.1	400	484-01	DT481	ST-4-1	TC-1	
100	0.1	400	684-01	DT681	ST-6-01	TC-11	
101	0.1	400	484-01	DT481	ST-4-1	TC-1	
102	0.1	400	684-01	DT681	ST-6-01	TC-11	
103	0.1	400	484-01	DT481	ST-4-1	TC-1	
104	0.1	400	684-01	DT681	ST-6-01	TC-11	
105	0.1	400	484-01	DT481	ST-4-1	TC-1	
106	0.1	400	684-01	DT681	ST-6-01	TC-11	
107	0.1	400	484-01	DT481	ST-4-1	TC-1	
108	0.1	400	684-01	DT681	ST-6-01	TC-11	
109	0.1	400	484-01	DT481	ST-4-1	TC-1	
110	0.1	400	684-01	DT681	ST-6-01	TC-11	
111	0.1	400	484-01	DT481	ST-4-1	TC-1	
112	0.1	400	684-01	DT681	ST-6-01	TC-11	
113	0.1	400	484-01	DT481	ST-4-1	TC-1	
114	0.1	400	684-01	DT681	ST-6-01	TC-11	
115	0.1	400	484-01	DT481	ST-4-1	TC-1	
116	0.1	400	684-01	DT681	ST-6-01	TC-11	

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (OUTPUT)

ITEM No.	RATING	REPLACEMENT DATA		INSTALLATION NOTES
		DC RES.	NATIONAL PART No.	
95	2500W	3.25	A-3825	THORARN PART No. T22860
		2172		A-2802

SPEAKER

ITEM No.	RATINGS	REPLACEMENT DATA		INSTALLATION NOTES
		NATIONAL PART No.	JENSEN PART No.	
94	FIELD	VC IMP.	ST-117	QUAM PART No. 8A31
95	FM	3.25	Mod. P8-T	
	7-3/4	VC DIA.		
		3/4"		

R F COILS

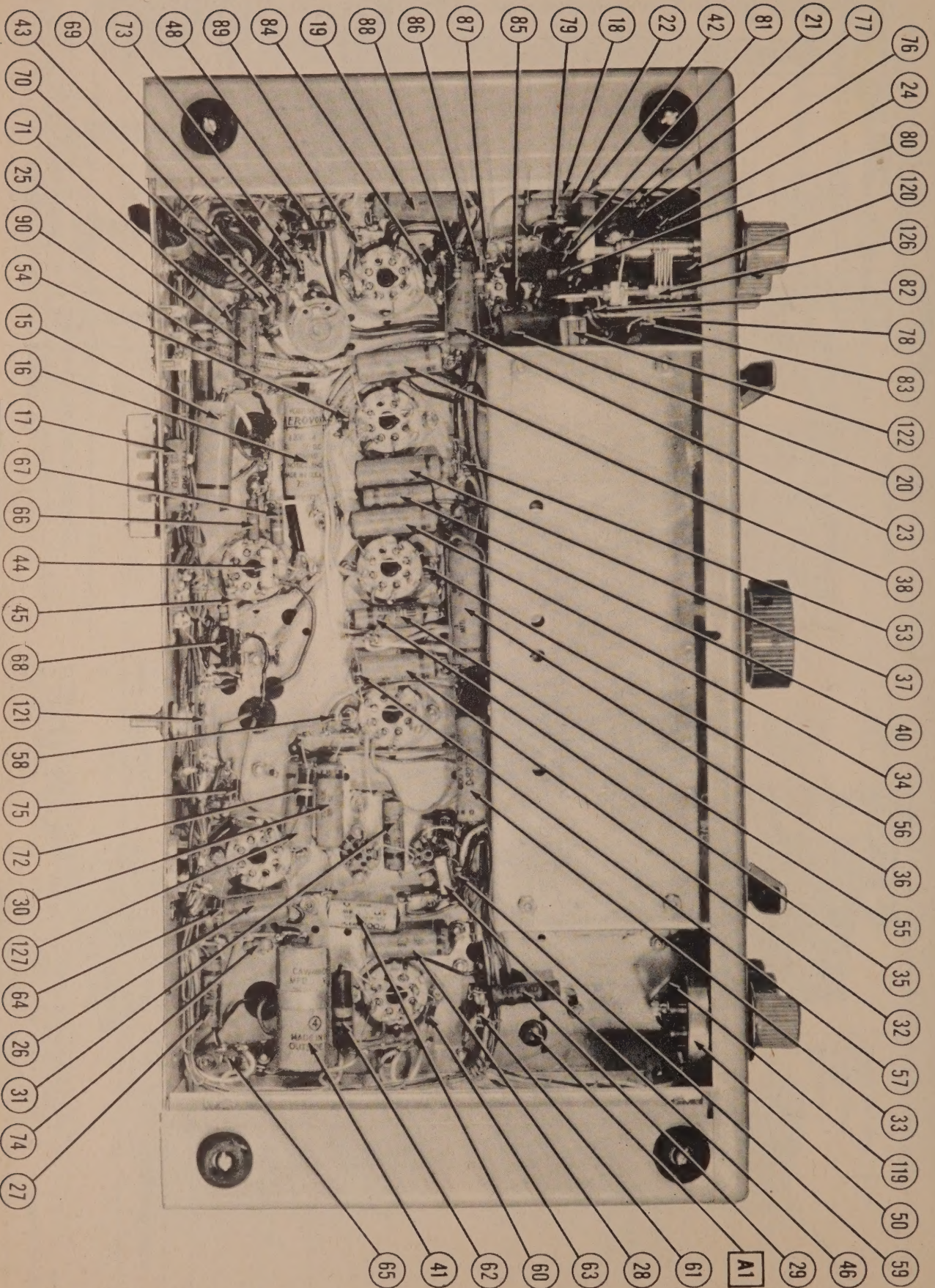
ITEM No.	USE	DC RES.		REPLACEMENT DATA		INSTALLATION NOTES
		PRI.	SEC.	NATIONAL PART No.	MEISSNER PART No.	
96	Ant. Coil	0.62	0.92			
97	"	0.32	0.12			
98	"	0.22	0.12			
99	"	0.22	0.12			
100	1st RF	0.12	0.82			
101	"	0.12	0.82			
102	"	0.12	0.82			
103	"	0.12	0.82			
104	2nd RF	0.12	0.82			
105	"	0.12	0.82			
106	"	0.12	0.82			
107	"	0.12	0.82			
108	Osc. Coil	0.12	0.82			
109	"	0.12	0.82			
110	"	0.12	0.82			
111	"	0.12	0.82			
112	1st IF	0.12	0.82			
113	2nd IF	0.12	0.82			
114	3rd IF	0.12	0.82			
115	RF Osc.	0.12	0.82			

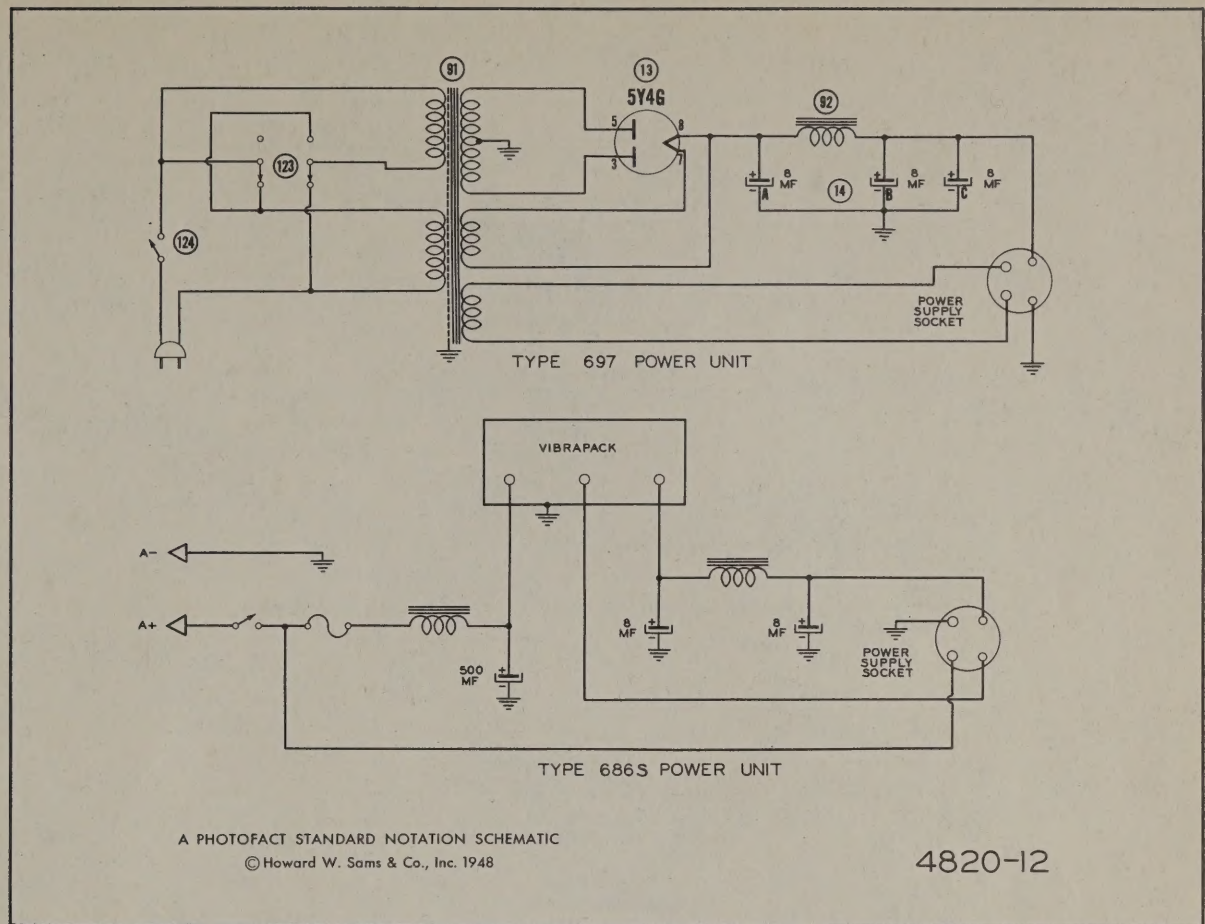
DIAL LIGHT

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		INSTALLATION NOTES
					NATIONAL PART No.	MEISSNER PART No.	
116	Screw	6-8	0.15	Brown			Type 47

MISCELLANEOUS

ITEM No.	PART NAME	NATIONAL PART No.	NOTES
117	Switch		AVC
118	"		Crystal Selectivity
119	"		B+
120	"		Tone
121	"		Radio-Phono
122	"		CW Osc.
123	"		118-250 Volt
124	"		Power
125	4 Gang Var. Cap.		
126	BFO Tuning Cap.		
128	Crystal Resonant		
	OT		(13-231MFT) each section





4820-12

MAIN TUNING DIAL

The main tuning dial should normally give no trouble. If, however, the dial should become removed from the Receiver it should NOT be operated until mounted on the condenser shaft WITH SET-SCREWS TIGHT. This is because the dial is only designed to rotate for ten revolutions (0 to 500) and if turned farther than this the mechanism will be damaged. When mounted on the condenser, limit stops protect the dial provided the assembly is properly done. The procedure for re-mounting the dial is as follows:

(a) Place dial on condenser shaft, tighten set-screws and turn dial counter-clockwise to fully mesh condenser rotor plates so that the tips of the rotor plates are flush with the edge of the stator plates.

(b) Loosen set-screws and rotate dial slowly until dial reading has decreased to zero.

(c) Tighten the set-screws.

(d) Check position of rotor plates at zero. The tips of the rotor plates should be flush with the edge of the stator plates at zero. A slight adjustment may be necessary and this is done by loosening the set-screws, adjusting the position of the dial and tightening the set-screws again.

If it is necessary to remove the dial at any future time, turn to 250 before removing the dial, and do not disturb the setting of either the dial or condenser until reassembled. If in doubt about the correct position, inspect the springs on the back of the dial. When the dial reads 250 these springs should be straight-up-and-down, they must not be tipped to one side.

It is important that the backplate and dial do not become separated.

The backplate is held in place by two springs so that its gear teeth mesh with the dial gear teeth in correct relationship for proper dial operation. If this backplate should be sprung out of place, it may return to an incorrect position and the proper dial numbers will not appear in the windows when the dial is used. To ascertain that the two parts are in correct position, proceed as follows:

(a) Locate small window near outer periphery of dial backplate and also locate dial number window on face of dial which is 180° removed from the small backplate window.

(b) Hold dial so backplate lies flat in palm of left-hand and with right hand rotate dial knob until 250 appears in previously located dial window.

(c) If dial is properly adjusted it will be noted that the pointer at the outer edge of the small window lines up with a marked tooth on the dial itself. It will be found that the dial and backplate can be moved so that the backplate pointer will mesh between teeth at points equi-distant from marked tooth in either direction.

(d) If by checking as in paragraph, (c), the dial is found not properly adjusted, it will be necessary to separate the backplate from the dial far enough to bring the two gears out of mesh and then re-mesh the two parts until the proper setting is found. A number of trials may be required before the correct mesh is found.

BANDSPREAD SWITCHING PROCEDURE

The bandspread switch for bands A, B, C and D are located on each coil set. Inspection of the coil set terminal panels will show several small rectangular metal pieces. There are two of these metal pieces or terminal blocks on each coil which are tapped and countersunk for a flat-head machine screw. It will be noted that these terminal blocks correspond to contacts numbered 1 and 2 on the antenna and RF coils and to contacts numbered 2 and 3 on the oscillator coils. Looking at the coil forms from the front and top the bandswitch screws must be in the left-hand position (in line with contact #2 of the antenna and RF coils and contact #3 of the oscillator coil) for general coverage tuning. On the schematic diagram and the circuit diagrams of the individual coils this position is designated with the letter "B". The coil range will be shown on the top scale of the calibration chart on the front of each coil set. To change to bandspread it is necessary to move the screw to the right-hand position (in line with contact #1 on the antenna and RF coils and contact #2 on the oscillator coil). On the schematic diagram and the circuit diagrams of the individual coils this position is designated with the letter "A". The coil range will be shown on the bottom scale of the calibration chart on the front of each coil set. The numbers shown on the schematic diagram and the circuit diagrams of the individual coils correspond to the contacts as they are numbered on each coil set.

VOLTAGE AND RESISTANCE TAKEN WITH AC LINE SET AT 115V AC.
 VOLTAGE AND RESISTANCE TAKEN ON BAND "D".
 SELECTIVITY CONTROL IN OFF POSITION.
 TONE CONTROL SET AT HIGH POSITION.
 RF GAIN SET AT MAXIMUM. AF GAIN SET AT MINIMUM.
 PHASING CONTROL AT 0. AVC ON. B+ SWITCH ON.
 RADIO-PHONO SWITCH IN RADIO POSITION.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6K7	0V.	0V.	220VDC	85VDC	2.6VDC	0V.	6.2VAC	2.6VDC
2	6K7	0V.	0V.	220VDC	85VDC	2.6VDC	0V.	6.2VAC	2.6VDC
3	6J7	0V.	0V.	220VDC	180VDC	8VDC	0V.	6.2VAC	8VDC
4	6C4	150VDC	0V.	0V.	6.2VAC	150VDC	-25VDC§	0V.	-
5	6J7	0V.	0V.	205VDC	85VDC	4VDC	0V.	6.2VAC	4VDC
6	6K7	0V.	0V.	205VDC	85VDC	2.6VDC	0V.	6.2VAC	2.6VDC
7	6H6	0V.	0V.	0V.	0V.	-.1VDC	-.1VDC	5VAC	0V.
8	6J7	0V.	0V.	50VDC	20VDC	0V.	0V.	6.2VAC	0V.
9	6H6	0V.	0V.	0V.	0V.	0V.	0V.	5VAC	0V.
10	6SJ7	0V.	0V.	0V.	0V.	1.6VDC	45VDC	6.2VAC	115VDC
11	6V6GT	0V.	0V.	210VDC	220VDC	0V.	0V.	6.2VAC	12.5VDC
12	0A2	150VDC	0V.	0V.	0V.	150VDC	0V.	0V.	-
13	5Y3GT	0V.	250VDC	0V.	295VAC	0V.	295VAC	0V.	250VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
1	6K7	0Ω	0Ω	40KΩ	30KΩ	330Ω	INF.	.1Ω	330Ω
2	6K7	0Ω	0Ω	40KΩ	30KΩ	330Ω	INF.	.1Ω	330Ω
3	6J7	0Ω	0Ω	40KΩ	140KΩ	4.7KΩ	INF.	.1Ω	4.7KΩ
4	6C4	40KΩ	INF.	0Ω	.1Ω	40KΩ	22KΩ	.4Ω	-
5	6J7	0Ω	0Ω	40KΩ	30KΩ	1.2KΩ	INF.	.1Ω	1.2KΩ
6	6K7	0Ω	0Ω	40KΩ	30KΩ	330Ω	INF.	.1Ω	330Ω
7	6H6	0Ω	0Ω	1.5 Meg	0Ω	120KΩ	120KΩ	4.4Ω	0Ω
8	6J7	0Ω	0Ω	130KΩ	100KΩ	0Ω	INF.	.1Ω	0Ω
9	6H6	0Ω	0Ω	220KΩ	700KΩ	460KΩ	1.5 Meg.	4.4Ω	220KΩ
10	6SJ7	0Ω	0Ω	0Ω	500KΩ	2.2KΩ	1 Meg.	.1Ω	170KΩ
11	6V6GT	0Ω	0Ω	40KΩ	40KΩ	470KΩ	INF.	.1Ω	330Ω
12	0A2	40KΩ	0Ω	INF.	0Ω	40KΩ	0Ω	0Ω	-
13	5Y3GT	INF.	40KΩ	INF.	340Ω	INF.	355Ω	INF.	40KΩ

*LIMITER CONTROL ON.

#CWO ON.

RESISTANCE READINGS IN THE B+ CIRCUITS MAY VARY WIDELY
 ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.